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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

PILKINGTON, JAMES

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/551,739	<b>Applicant(s)</b> MARUYAMA ET AL.	
	<b>Examiner</b> JAMES PILKINGTON	<b>Art Unit</b> 3656	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2011.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3 and 6-13 is/are pending in the application.
- 4a) Of the above claim(s) 7-9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,6 and 10-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                    | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Objections***

Claim 3 is objected to because of the following informalities: Claim 3, line 2, "a line obliquely" should be - - the line obliquely- - since the line has been incorporated into claim 1. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 6 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harris, USP 3,445,148, in view of Tanaka, US PGPub 2002/0001420.

Regarding claims 1 and 3, Harris discloses an oil-impregnated sintered bearing comprising: a bearing body (blank 50, finished product 52) made of a sintered metal (see column 4 lines 24-28) to support a rotating shaft by an inner surface thereof as a friction surface (column 5 lines 45-59 discloses that a shaft is supported by the bearing), said bearing body (52) having a bearing hole (central opening) therein; wherein the bearing hole includes a journal part (52b) that has a constant diameter, and enlarged diameter parts (at 52a) that are provided on both sides of the journal part (see Figure 3B) in the longitudinal direction thereof, respectively, so as to be connected with the journal part; and cavities (pores) exposed on an inner surface of the enlarged diameter part are smaller in size and fewer in number (52a is disclosed as having greater density

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and lower permeability, see column 5 lines 23-44, smaller and fewer pores results in a greater density and lower permeability) than those cavities exposed on an inner surface of the journal part (52b is disclose as having a lower density and greater permeability, see column 5 lines 23-44, larger and a greater number of pores results in a lower density and greater permeability), wherein each of the enlarged diameter parts has a taper angle with respect to the longitudinal direction of the enlarged diameter part which is provided on one side of the journal part, and a taper angle with respect to the longitudinal direction of the other enlarged diameter part, and each of the enlarged diameter parts includes a first part connected with an end of the journal part (tapered face is first part), the journal part and first parts respectively support the shaft; and a taper angle between the first parts and the axial direction of the bearing body are equal to each other (each side of 52 in Figure 3b has a taper). It is also noted that Harris discloses the same pressing steps used to form the bearing as in the instant application including coining/pressing the ends of the blank, see column 5 lines 23-44, since Harris uses the same/similar method the resulting structure will have the ends of the bearing having a smaller pore size and fewer pores.

Harris does not disclose that each of the enlarged diameter parts has taper angles which change stepwise with respect to a longitudinal direction of the enlarged diameter part such that the taper angle increases with increasing distance from the journal part, a line obliquely extending along an inclined surface of one of the first parts is arranged parallel to a line obliquely extending along an inclined surface of the other first part, and a distance between the lines is substantially equal to the diameter of the

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rotating shaft; a shortest distance between the line obliquely extending along an inclined surface of one of the first parts and the journal part across a middle axis of the bearing body is substantially equal to the diameter of the rotating shaft [claim 3].

Tanaka teaches a bearing having a journal part (32) and enlarged diameter parts (33), the enlarged diameter parts has taper angles which change stepwise (first surface 33 and additional taper at the openings, see Figure 10) with respect to a longitudinal direction of the enlarged diameter parts such that the taper angle increase with increasing distance from the journal part on each end of the journal parts, a line obliquely extending along an inclined surface of a first part (first taper from the main journal part 32) is arranged parallel to a line obliquely extending along an inclined surface of another first part on the other side of the journal part, and a distance between the lines is substantially equal to the diameter of the rotating shaft (paragraphs 0040-0042, surfaces 33 are sized to support the shaft even when inclined); and wherein a shortest distance between a line obliquely extending along an inclined surface of one of the first parts (33) and the journal part facing across a middle axis of the bearing body is substantially equal to the diameter of the rotation shaft (the distance between an oblique line from surface 33 to the center of the journal surface 32 on the opposite side of the bearing is substantially equal to the diameter of the rotating shaft so that the shaft can shift within the bearing, see Figures 10 and 12), for the purpose of sizing the enlarged diameters of the bearing so that they can support the shaft when the shaft is inclined relative to the axis of the bearing to increase the lifetime of the bearing (column 4 lines 37-48).

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Harris and provide each of the enlarged diameter parts with taper angles which change stepwise with respect to a longitudinal direction of the enlarged diameter part such that the taper angle increases with increasing distance from the journal part, a line obliquely extending along an inclined surface of one of the first parts is arranged parallel to a line obliquely extending along an inclined surface of the other first part, and a distance between the lines is substantially equal to the diameter of the rotating shaft; a shortest distance between the line obliquely extending along an inclined surface of one of the first parts and the journal part across a middle axis of the bearing body is substantially equal to the diameter of the rotating shaft, as taught by Tanaka, for the purpose of providing a bearing that can support a shaft when the shaft is inclined relative to the axis of the bearing to increase the lifetime of the bearing.

Harris also does not that the taper angles with respect to the longitudinal direction of the first parts of the enlarged diameter parts are  $3^\circ$  or less with respect to the journal portion.

Since the applicant is silent to any criticality or unexpected results from having the angle set at 3 degrees or less it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the teachings of Harris and provide an angle of 3 degrees or less since the device of would perform perfectly well with any acute angle, the particular angle of 3 degrees is a matter of design choice. The amount

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of the angle provides the predictable result of limiting of movement within the shaft and one of ordinary skill in the art would design the bearing with the appropriate angle to limit the range of movement based on the application of the bearing.

Regarding claim 6, Harris in view of Tanaka does not disclose that the difference between the taper angles of adjacent parts of each of the enlarged diameter parts is 3° or less.

Since the applicant is silent to any criticality or unexpected results from having the difference in taper angles between adjacent section set at 3 degrees or less it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the teachings of Harris and provide an angle difference of 3 degrees or less since the device of would perform perfectly well with any acute angle, the particular difference of 3 degrees between adjacent parts is a matter of design choice. The amount of the angle provides the predictable result of limiting of movement within the shaft and one of ordinary skill in the art would design the bearing with the appropriate angle to limit the range of movement based on the application of the bearing.

Regarding claim 10, Harris discloses an oil-impregnated sintered bearing which includes a bearing body (50/52) made of a sintered metal to support a rotating shaft (see column 4 lines 24-28 and column 5 lines 45-59), the bearing body (52) having a bearing hole (central opening) formed therein, the bearing hole including a journal part (52b) of which an inner surface as a friction surface has a constant diameter and

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enlarged diameter parts (52a) that are provided so as to be connected with the journal part and are formed in a tapered shape (see Figure 3b) having diameters to be enlarged toward the tips thereof, wherein the bearing hole that includes the journal part (52b) having a constant diameter is formed by pressing (see Figures 1a-1d) an inner circumferential surface of a cylindrical sintered body completely sintered; and the enlarged diameter parts (52a) so as to be connected with the journal part are formed by re-pressing (additional coining/pressing process, see column 5 lines 23-44) the inner circumferential surface of the cylindrical sintered body and cavities (pores) exposed on an inner surface of the enlarged diameter part are smaller in size and fewer in number (52a is disclosed as having greater density and lower permeability, see column 5 lines 23-44, smaller and fewer pores results in a greater density and lower permeability) than those cavities exposed on an inner surface of the journal part (52b is disclosed as having a lower density and greater permeability, see column 5 lines 23-44, larger and a greater number of pores results in a lower density and greater permeability). It is also noted that Harris discloses the same pressing steps used to form the bearing as in the instant application including coining/pressing the ends of the blank, see column 5 lines 23-44, since Harris uses the same/similar method the resulting structure will have the ends of the bearing having a smaller pore size and fewer pores.

Harris does not disclose that each of the enlarged diameter parts has taper angles which change stepwise with respect to a longitudinal direction of the enlarged diameter part such that the taper angle increases with increasing distance from the journal part, a line obliquely extending along an inclined surface of one of the first parts

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is arranged parallel to a line obliquely extending along an inclined surface of the other first part, and a distance between the lines is substantially equal to the diameter of the rotating shaft; a shortest distance between the line obliquely extending along an inclined surface of one of the first parts and the journal part across a middle axis of the bearing body is substantially equal to the diameter of the rotating shaft [claim 3].

Tanaka teaches a bearing having a journal part (32) and enlarged diameter parts (33), the enlarged diameter parts has taper angles which change stepwise (first surface 33 and additional taper at the openings, see Figure 10) with respect to a longitudinal direction of the enlarged diameter parts such that the taper angle increase with increasing distance from the journal part on each end of the journal parts, a line obliquely extending along an inclined surface of a first part (first taper from the main journal part 32) is arranged parallel to a line obliquely extending along an inclined surface of another first part on the other side of the journal part, and a distance between the lines is substantially equal to the diameter of the rotating shaft (paragraphs 0040-0042, surfaces 33 are sized to support the shaft even when inclined); and wherein a shortest distance between a line obliquely extending along an inclined surface of one of the first parts (33) and the journal part facing across a middle axis of the bearing body is substantially equal to the diameter of the rotation shaft (the distance between an oblique line from surface 33 to the center of the journal surface 32 on the opposite side of the bearing is substantially equal to the diameter of the rotating shaft so that the shaft can shift within the bearing, see Figures 10 and 12), for the purpose of sizing the enlarged diameters of the bearing so that they can support the shaft when the shaft is inclined

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relative to the axis of the bearing to increase the lifetime of the bearing (column 4 lines 37-48).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Harris and provide each of the enlarged diameter parts with taper angles which change stepwise with respect to a longitudinal direction of the enlarged diameter part such that the taper angle increases with increasing distance from the journal part, a line obliquely extending along an inclined surface of one of the first parts is arranged parallel to a line obliquely extending along an inclined surface of the other first part, and a distance between the lines is substantially equal to the diameter of the rotating shaft; a shortest distance between the line obliquely extending along an inclined surface of one of the first parts and the journal part across a middle axis of the bearing body is substantially equal to the diameter of the rotating shaft, as taught by Tanaka, for the purpose of providing a bearing that can support a shaft when the shaft is inclined relative to the axis of the bearing to increase the lifetime of the bearing.

Harris also does not that the taper angles with respect to the longitudinal direction of the first part of the enlarged diameter parts are  $3^{\circ}$  or less with respect to the journal portion.

Since the applicant is silent to any criticality or unexpected results from having the angle set at 3 degrees or less it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the teachings of Harris and provide

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an angle of 3 degrees or less since the device of would perform perfectly well with any acute angle, the particular angle of 3 degrees is a matter of design choice. The amount of the angle provides the predictable result of limiting of movement within the shaft and one of ordinary skill in the art would design the bearing with the appropriate angle to limit the range of movement based on the application of the bearing.

Claim 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harris, USP 3,445,148, in view of Teruo, JP064-030922.

Regarding claim 11 Harris discloses an oil-impregnated sintered bearing comprising: a bearing body (blank 50, finished product 52) made of a sintered metal (see column 4 lines 24-28) to support a rotating shaft by an inner surface thereof as a friction surface (column 5 lines 45-59 discloses that a shaft is supported by the bearing), said bearing body (52) having a bearing hole (central opening) therein; wherein the bearing hole includes a journal part (52b) that has a constant diameter, and enlarged diameter parts (at 52a) that are provided on both sides of the journal part (see Figure 3B) in the longitudinal direction thereof, respectively, so as to be connected with the journal part; and cavities (pores) exposed on an inner surface of the enlarged diameter part are smaller in size and fewer in number (52a is disclosed as having greater density and lower permeability, see column 5 lines 23-44, smaller and fewer pores results in a greater density and lower permeability) than those cavities exposed on an inner surface of the journal part (52b is disclose as having a lower density and greater permeability, see column 5 lines 23-44, larger and a greater number of pores results in a lower

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density and greater permeability). It is also noted that Harris discloses the same pressing steps used to form the bearing as in the instant application including coining/pressing the ends of the blank , see column 5 lines 23-44, since Harris uses the same/similar method the resulting structure will have the ends of the bearing having a smaller pore size and fewer pores.

Harris does not disclose that the enlarged diameter part is only on one side of the journal part and a chamfered portion is provided on the other side of the journal part.

Teruo teaches that a bearing (1, see Figure 1) configuration can comprise a shape that has a journal part (3a) of constant diameter, an enlarged diameter part (3b) that is only on one side of the journal part, and a chamfered portion (3a) provided on the other side of the journal part.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Harris and use shape that has the enlarged diameter part only on one side of the journal part and a chamfered portion provided on the other side of the journal part, as taught by Teruo, since altering and/or substituting the shape of the bearing based on the desired environment of use for the bearing yields the predictable result of rotatably supporting a shaft in a housing. Also, a person with ordinary skill in the art has good reason to pursue the known options (disclosed bearing shapes) within his or her technical grasp, the changing of a bearings shape is a known option which has a finite number of possible arrangements, no taper, one taper, two tapers, steps, one chamfer or two chamfers, all these shapes where known at the time

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of filing and it would have been obvious to try the shapes with the sintered compact disclosed in Harris.

Regarding claim 12, Teruo discloses that the journal part (3a) and the enlarged diameter part (3b) are formed so that a distance between a line obliquely extending along an inclined surface of the enlarged diameter part toward the center of the bearing body and an inner wall surface of the journal part is slightly larger than a diameter of the rotating shaft (at the intersecting point of 3b and 3a, to the right of 3a and the left of 3b) the diameter is slightly larger than the diameter of the shaft).

Regarding claim 13, Harris in view of Teruo also does not that a taper angle between an inclined plane of the enlarged diameter part and an inner surface of the journal part parallel to the axial direction of the bearing body is set to  $3^{\circ}$  or less.

Since the applicant is silent to any criticality or unexpected results from having the angle set at 3 degrees or less it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the teachings of Harris and provide an angle of 3 degrees or less since the device of would perform perfectly well with any acute angle, the particular angle of 3 degrees is a matter of design choice. The amount of the angle provides the predictable result of limiting of movement within the shaft and one of ordinary skill in the art would design the bearing with the appropriate angle to limit the range of movement based on the application of the bearing.

***Response to Arguments***

Applicant's arguments with respect to claims 1, 3, 6 and 10-13 have been considered but are moot in view of the new ground(s) of rejection.

Regarding Applicant's remarks related to the functional and purpose of the claimed device: The function and purpose of the bearing is not recited in the rejected claims, however, even if amended into the claims, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In this case, the new combination made above meets the structural limits of the claim.

Regarding Applicant's remarks that the enlarged part of Harris is merely black dots showing greater density: The black dots are in the region of the enlarged diameter part, but the dots are not the enlarged diameter part. The enlarged diameter part in Harris is the chamfered surfaces at the ends of the sleeve, the chamfered surface extends outward in the radially direction from the sleeve. These chamfers are part of the sleeve which makes the chamfers surfaces that support the shaft, the way in which the chamfers support the shaft may be different from the instant application but the chamfer meets the structural limitation of the claim.

Regarding Applicant's remarks that Harris merely discloses sintering: Harris discloses the following steps; forming a compacted powdered metal blank, after the blank is formed pressing the blank (coining). The extra pressing/coining of the blank

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after initial forming the blank is the same pressing steps used to form the bearing as in the instant application; in fact it appears that Harris uses the same style of tool for the final pressing as the instant application. Since Harris uses the same/similar method and tool the resulting structure will have the ends of the bearing having a smaller pore size and fewer pores.

Applicant's argues that one of ordinary skill in the art would not combined Harris and Tanaka since Tanaka uses a slide member to lower friction and not a metal to metal contact disclosed in Harris, and that Tanaka does not discloses the parallel lines that are the width of the shaft

Tanaka is being relied upon for the teaching of the shape of the journal part not the adding of any additional material to the sliding surface. One of ordinary skill in the art would indeed view Tanaka as a teaching for a different shape that can be used for a journal bearing and one having ordinary skill in the art has the knowledge and ability to select between known journal bearing shapes based on the use, loading and wear that is expected to occur. Tanaka also states in paragraph 0042 that "Even if a shaft inserted into the bearing is inclined relative to the axis of the bearing, the shaft can be properly supported by one of the end surfaces 33, there by increasing the lifetime of the bearing." In order to "properly support" the shaft the tapered surfaces must be parallel and "substantially equal to the diameter of the rotating shaft." The phrase "substantially equal" does not limit space between the lines to the "width of the shaft" as argued.

### ***Conclusion***

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Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES PILKINGTON whose telephone number is (571)272-5052. The examiner can normally be reached on Monday - Friday 7-3.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on (571)272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAMES PILKINGTON/  
Examiner, Art Unit 3656  
3/29/11